

CLAIM AMENDMENTS

This listing of claims will replace all prior versions and listings of claims in the application.

1 1. (Currently Amended) A method of monitoring and diagnosing resource
2 utilization within a connection oriented network made of network elements, at least
3 one of said network elements including a connection resource tracker for
4 maintaining a database of resource utilization, the method comprising the steps of:

5 specifying a plurality of resource types for the network elements of the
6 connection oriented network, each resource type being defined by a capacity limit
7 and a utilization;

8 providing a utilization threshold and a specified threshold for each specified
9 type of resource, wherein the utilization threshold is set at a threshold value used to
10 determine whether resources are being over-utilized and the specified threshold is
11 set at a threshold value used to determine whether resources used are exceeding a
12 maximum allowable limit;

13 monitoring for receipt of call connection establishment signals;

14 measuring the utilization for all resources at the network elements;

15 in response to a query from a user relating to a particular type of resource,
16 comparing the utilization for all resources of the particular type as measured in the
17 measuring step with the utilization threshold for said particular type for

determining whether the utilization of any resource of said particular type is above the corresponding utilization threshold;

if the utilization is above the corresponding utilization threshold for at least one said resource, generating a report and identifying in the report each resource of the particular type for which the utilization is above the corresponding utilization threshold and presenting the report to an operator of said connection oriented network; and

if the utilization is above the corresponding specified threshold for at least one said resource, checking a timer associated with the resource; and

when the timer has expired, generating an alarm for the resource and resetting the timer associated with the resource only when the alarm has been generated for the resource.

2. (Previously Presented) The method of claim 1, wherein the plurality of resource types includes at least one of bandwidth, line card capacity, number of connection end points per line card, Virtual Path Identifier numbers, Virtual Connection Identifier numbers, MultiProtocol Label Switching (MPLS) label numbers, memory within the switch, number of supportable leaf endpoints per system, number of supportable connections in a connecting state, number of MPLS state blocks, and number of connections in a database.

1 3. (Previously Presented) The method of claim 1, wherein the step of comparing
2 the utilization for all resources is carried out only with respect to resources within a
3 list of resources.

1 4. (Previously Presented) The method of claim 3, further comprising:
2 receiving at least one utilization threshold from the operator.

5. (Canceled).

1 6. (Previously Presented) The method of claim 1, wherein the step of generating
2 the report further comprises:
3 receiving at least one utilization threshold from the operator.

1 7. (Previously Presented) The method of claim 1, wherein the step of generating
2 the report further comprises:
3 including the utilization of any identified resources in the report.

1 8. (Previously Presented) The method of claim 7, wherein the step of specifying
2 the plurality of resource types further comprises:
3 providing a list of resources, the list of resources including at least one of
4 bandwidth, line card capacity, number of connection end points per line card,
5 Virtual Path Identifier numbers, Virtual Connection Identifier numbers,

MultiProtocol Label Switching (MPLS) label numbers, memory within the switch, number of supportable leaf endpoints per system, number of supportable connections in a connecting state, number of MPLS state blocks, and number of connections in a database, the step of generating the report is carried out only with respect to resources within the list of resources, and further comprising:

receiving at least one utilization threshold from the operator.

9. (Previously Presented) The method of claim 1, further comprising the steps of:

upon identification of a resource for which the utilization is above the specified threshold, generating an alarm identifying the resource; and

presenting the alarm to the operator.

10. (Previously Presented) The method of claim 1, further comprising:

receiving at least one utilization threshold from the operator.

11. (Previously Presented) The method of claim 1, wherein the step of determining whether the utilization of the resource is above the corresponding utilization threshold and the step of identifying each such resource are carried out repeatedly.

12. (Previously Presented) The method of claim 1, further comprising:

a step of pausing after the step of identifying each resource for which the utilization is above the corresponding utilization threshold.

1 13. (Currently Amended) The method of claim 1, further comprising:

2 ~~monitoring for receipt of call connection establishment signals, wherein the~~
3 step of determining whether the utilization of the resource is above the
4 corresponding utilization threshold and the step of identifying each such resource
5 are carried out only upon receipt of a call connection establishment signal.

1 14. (Previously Presented) The method of claim 13, further comprising:

2 determining whether the alarm has been generated since the utilization of
3 the resource last rose above the specified threshold,

4 wherein the step of generating the alarm is carried out only if the alarm has
5 not been generated since the utilization of the resource last rose above the specified
6 threshold.

1 15. (Previously Presented) The method of claim 14, wherein the step of generating
2 the report further comprises:

3 including the utilization of any identified resources in the report.
4

1 16. (Previously Presented) The method of claim 15, wherein the step of specifying
2 the plurality of resource types further comprises:

3 providing a list of resources, the list of resources including at least one of
4 bandwidth, line card capacity, number of connection end points per line card,
5 Virtual Path Identifier numbers, Virtual Connection Identifier numbers,

MultiProtocol Label Switching (MPLS) label numbers, memory within the switch, number of supportable leaf endpoints per system, number of supportable connections in a connecting state, number of MPLS state blocks, and number of connections in a database, the step of determining whether the utilization of the resource is above the corresponding utilization threshold is carried out only with respect to resources within the list of resources, and further comprising:

receiving at least one utilization threshold from the operator.

17. (Currently Amended) A processor for monitoring resource utilization within a connection oriented network made of network elements, at least one of said network elements including a connection resource tracker for maintaining a database of resource utilization, the processor comprising:

instructions for specifying a plurality of resource types for the network elements of the connection oriented network, each resource type being defined by a capacity limit and a utilization;

instructions for providing a utilization threshold and a specified threshold for each specified type of resource, wherein the utilization threshold is set at a threshold value used to determine whether resources are being over-utilized and the specified threshold is set at a threshold value used to determine whether resources used are exceeding a maximum allowable limit;

instructions for measuring the utilization for all resources at the network elements;

15 instructions for monitoring for receipt of call connection establishment
16 signals;

17 instructions for, in response to a query from a user relating to a particular
18 type of resource in said database, comparing the measured utilization for all
19 resources of the particular type with the utilization threshold for said particular
20 type for determining whether the utilization of any resource of said particular type
21 is above the corresponding utilization threshold;

22 instructions for, if the utilization is above the corresponding utilization
23 threshold for at least one said resource, generating a report and identifying in the
24 report each resource of the particular type for which the utilization is above the
25 corresponding utilization threshold and presenting the report to an operator of said
26 connection oriented network; and

27 instructions for, if the utilization is above the corresponding specified
28 threshold for at least one said resource, checking a timer associated with the
29 resource;

30 instructions for, when the timer associated with the resource has expired,
31 generating an alarm for the resource and resetting the timer associated with the
32 resource only when the alarm has been generated for the resource.

1 18. (Previously Presented) The processor of claim 17, wherein the plurality of
2 resources includes at least one of bandwidth, line card capacity, number of
3 connection end points per line card, Virtual Path Identifier numbers, Virtual

4 Connection Identifier numbers, MultiProtocol Label Switching (MPLS) label
5 numbers, memory within the switch, number of supportable leaf endpoints per
6 system, number of supportable connections in a connecting state, number of MPLS
7 state blocks, and number of connections in a database.

1 19. (Previously Presented) The processor of claim 17, further comprising:

2 instructions for providing a list of resources, wherein the instructions for
3 determining whether the utilization of the resource is above the corresponding
4 utilization threshold make this determination only with respect to resources within
5 the list of resources.

1 20. (Previously Presented) The processor of claim 19, further comprising:

2 instructions for receiving at least one utilization threshold from the operator.

21. (Canceled).

1 22. (Previously Presented) The processor of claim 17, further comprising:

2 instructions for receiving at least one utilization threshold from the operator.

1 23. (Previously Presented) The processor of claim 17, wherein the instructions for
2 generating the report further comprise:

instructions for including the utilization of any identified resources in the report.

24. (Previously Presented) The processor of claim 23, further comprising:

instructions for providing a list of resources, the list of resources including at least one of bandwidth, line card capacity, number of connection end points per line card, Virtual Path Identifier numbers, Virtual Connection Identifier numbers, MultiProtocol Label Switching (MPLS) label numbers, memory within the switch, number of supportable leaf endpoints per system, number of supportable connections in a connecting state, number of MPLS state blocks, and number of connections in a database, wherein the instructions for determining whether the utilization of the resource is above the corresponding utilization threshold are executed only with respect to resources within the list of resources, and further comprising:

instructions for receiving at least one utilization threshold from the operator.

25. (Previously Presented) The processor of claim 17, further comprising:

instructions for, upon identification of a resource for which the utilization is above the specified threshold, generating an alarm identifying the resource; and

instructions for presenting the alarm to the operator.

26. (Previously Presented) The processor of claim 25, further comprising:

instructions for receiving at least one utilization threshold from the operator.

27. (Previously Presented) The processor of claim 25, further comprising:

instructions for executing the instructions for determining whether the utilization of the resource is above the corresponding utilization threshold and the instructions for identifying each such resource repeatedly.

28. (Previously Presented) The processor of claim 27, further comprising:

instructions for pausing after the instructions for identifying each resource for which the utilization is above the corresponding utilization threshold are executed.

29. (Previously Presented) The processor of claim 25, further comprising:

instructions for monitoring for receipt of call connection establishment signals; and

instructions for executing the instructions for determining whether the utilization of the resource is above the corresponding utilization threshold and the instructions for identifying each such resource upon receipt of a call connection establishment signal.

30. (Previously Presented) The processor of claim 29, further comprising:

instructions for determining whether the alarm has been generated since the utilization of the resource last rose above the corresponding specified threshold; and instructions for executing the instructions for generating the alarm only in the event that the alarm has not been generated since the utilization of the resource last rose above the corresponding specified threshold.

31. (Previously Presented) The processor of claim 30, wherein the instructions for generating the report further comprise:

instructions for including the utilization of any identified resources in the report.

32. (Previously Presented) The processor of claim 31, further comprising:

instructions for providing a list of resources, the list of resources including at least one of bandwidth, line card capacity, number of connection end points per line card, Virtual Path Identifier numbers, Virtual Connection Identifier numbers, MultiProtocol Label Switching (MPLS) label numbers, memory within the switch, number of supportable leaf endpoints per system, number of supportable connections in a connecting state, number of MPLS state blocks, and number of connections in a database; wherein the instructions for determining whether the utilization of the resource is above the corresponding utilization threshold are executed only with respect to resources within the list of resources, and further comprising:

instructions for receiving at least one utilization threshold from the operator.

33. (Currently Amended) A computer-readable medium comprising instructions for monitoring resource utilization within a connection oriented network made of network connections, at least one of said network elements including a connection resource tracker for maintaining a database of resource utilization, the computer-readable medium comprising:

instructions for specifying a plurality of resource types for the network elements of the connection oriented network, each resource type being defined by a capacity limit and a utilization;

instructions for providing a utilization threshold and a specified threshold for each specified type of resource, wherein the utilization threshold is set at a threshold value used to determine whether resources are being over-utilized and the specified threshold is set at a threshold value used to determine whether resources used are exceeding a maximum allowable limit;

instructions for measuring the utilization for all resources at a network element;

instructions for monitoring for receipt of call connection establishment signals;

instructions for, in response to a query from a user relating to a particular type of resource in said database, comparing the measured utilization for all resources of the particular type with the utilization threshold for said particular

21 type for determining whether the utilization of any resource of said particular type
22 is above the corresponding utilization threshold;

23 instructions for, if the utilization is above the corresponding utilization
24 threshold for at least one said resource, generating a report and identifying in the
25 report each resource of the particular type for which the utilization is above the
26 corresponding utilization threshold and presenting the report to an operator of said
27 connection oriented network; and

28 instructions for, if the utilization is above the corresponding specified
29 threshold for at least one said resource, checking a timer associated with the
30 resource; and

31 instructions for, when the timer has expired, generating an alarm for the
32 resource and resetting the timer associated with the resource only when the alarm
33 has been generated for the resource.

1 34. (Currently Amended) A method of monitoring resource utilization within a
2 connection oriented network made of network elements, at least one of said network
3 element including a connection resource tracker for maintaining a database of
4 resource utilization, the method comprising the steps of:

5 specifying a plurality of resource types for the network elements of the
6 connection oriented network, each resource type being defined by a capacity limit
7 and a utilization;

8 providing a utilization threshold and a specified threshold for each specified
9 type of resource, wherein the utilization threshold is set at a threshold value used to
10 determine whether resources are being over-utilized and the specified threshold is
11 set at a threshold value used to determine whether resources used are exceeding a
12 maximum allowable limit;

13 monitoring for receipt of call connection establishment signals;

14 measuring the utilization threshold for all resources at a network element;

15 in response to a query from a user relating to a particular type of resource in
16 said database, comparing the utilization for all resources of the particular type as
17 measured in the measuring step with the utilization threshold for said particular
18 type for determining whether the utilization of any resource of said particular type
19 is above the corresponding utilization threshold;

20 if the utilization is above the corresponding utilization threshold for at least
21 one said resource, generating a report and identifying in the report each resource of
22 the particular type for which the utilization is above the corresponding utilization
23 threshold and presenting the report to an operator of said connection oriented
24 network; and

25 if the utilization is above the corresponding specified threshold for at least
26 one said resource, checking whether a flag associated with the resource indicates
27 that an alarm has recently been generated for the resource and, if the flag does not
28 indicate that the alarm has recently been generated, generating the alarm and
29 setting the flag to indicate that the alarm has recently been generated.

35. (Canceled)

1 36. (Previously Presented) The method of claim 34, further comprising:

2 receiving at least one utilization threshold from the operator.

1 37. (Previously Presented) The method of claim 36, further comprising:

2 the step of providing a list of resources, wherein the step of determining
3 whether the utilization of the resource is below the corresponding utilization
4 threshold is carried out only with respect to resources within the list of resources.

1 38. (Previously Presented) The method of claim 37, wherein the step of generating
2 the report further comprises:

3 including the utilization of any identified resources in the report.

1 39. (Currently Amended) A processor for monitoring resource utilization within a
2 connection oriented network made of network elements, at least one of said network
3 elements including a connection resource tracker for maintaining a database of
4 resource utilization, the processor comprising:

5 instructions for specifying a plurality of resource types for the network
6 elements of the connection oriented network, each resource type being defined by a
7 capacity limit and a utilization;

instructions for providing a utilization threshold and a specified threshold for each specified type of resource, wherein the utilization threshold is set at a threshold value to determine whether resources are being over-utilized and the specified threshold is set at a threshold value used to determine whether resources used are exceeding a maximum allowable limit;

instructions for measuring the utilization for all resources at the network element;

instructions for monitoring for receipt of call connection establishment signals;

instructions for, in response to a query from a user relating to a particular type of resource in said database, comparing the measured utilization for all resources of the particular type with the utilization threshold for said particular type for determining whether the utilization of any resource of said particular type is above the corresponding utilization threshold;

instructions for, if the utilization is above the corresponding utilization threshold for at least one said resource, generating a report and identifying in the report each resource of the particular type for which the utilization is above the corresponding utilization threshold and presenting the report to an operator of said connection oriented network; and

instructions for, if the utilization is above the corresponding specified threshold for at least one said resource, checking whether a flag associated with the resource indicates that an alarm has recently been generated for the resource, and

30 if the flag does not indicate that the alarm has recently been generated, generating
31 the alarm and setting the flag to indicate that the alarm has recently been
32 generated.

40. (Canceled).

1 41. (Previously Presented) The processor of claim 39, further comprising:
2 instructions for receiving at least one utilization threshold from the operator.

1 42. (Previously Presented) The processor of claim 41, further comprising:
2 instructions for providing a list of resources, wherein the instructions for
3 determining whether the utilization of the resource is below the corresponding
4 utilization threshold are executed only with respect to resources within the list of
5 resources.

1 43. (Previously Presented) The processor of claim 42, wherein the instructions for
2 generating the report further comprise:
3 instructions for including the utilization of any identified resources in the
4 report.

1 44. (Currently Amended) A computer-readable medium comprising instructions for
2 monitoring resource utilization within a connection oriented network made of

network elements, at least one of said network elements including a connection resource tracker for maintaining a database of resource utilization, the computer-readable medium comprising:

instructions for specifying a plurality of resource types for the network elements of the connection oriented network, each resource type being defined by a capacity limit and a utilization;

instructions for providing a utilization threshold and a specified threshold for each specified type of resource, wherein the utilization threshold is set at a threshold value used to determine whether resources are being over-utilized and the specified threshold is set at a threshold value used to determine whether resources used are exceeding a maximum allowable limit;

instructions for measuring the utilization for all resources at the network element;

instructions for monitoring for receipt of call connection establishment signals;

instructions for, in response to a query from a user relating to a particular type of resource in said database, comparing the measured utilization for all resources of the particular type with the utilization threshold for said particular type for determining whether the utilization of any resource of said particular type is above the corresponding utilization threshold;

instructions for, if the utilization is above the corresponding utilization threshold for at least one said resource, generating a report and identifying in the

report each resource of the particular type for which the utilization is above the corresponding utilization threshold and presenting the report to an operator of said connection oriented network; and

instructions for, if the utilization is above the corresponding specified threshold for at least one said resource, checking whether a flag associated with the resource indicates that an alarm has recently been generated for the resource and if the flag does not indicate that the alarm has recently been generated, generating the alarm and setting the flag to indicate that the alarm has recently been generated.

45. (Currently Amended) A method of monitoring and diagnosing resource utilization within a connection oriented network made of network elements, at least one of said network elements including a connection resource tracker for maintaining a database of resource utilization, the method comprising the steps of:

specifying a plurality of resource types for the network elements of the connection oriented network, each resource type being defined by a capacity limit and a utilization;

providing a utilization threshold and a specified threshold for each specified type of resource, wherein the utilization threshold is set at a threshold value used to determine whether resources are being under-utilized and the specified threshold is set at a threshold value used to determine whether resources used are below a minimum allowable limit;

monitoring for receipt of call connection establishment signals;

measuring the utilization for all resources at a network elements;

in response to a query from a user relating to a particular type of resource,
comparing the utilization for all resources of the particular type as measured in the
measuring step with the utilization threshold for said particular type for
determining whether the utilization of any resource of said particular type is below
the corresponding utilization threshold;

if the utilization is below the corresponding utilization threshold for at least
one said resource, generating a report and identifying in the report each resource of
the particular type for which the utilization is below the corresponding utilization
threshold and presenting the report to an operator of said connection oriented
network; and

if the utilization is below the corresponding specified threshold for at least
one said resource, checking a timer associated with the resource; and

when the timer has expired, generating an alarm for the resource and
resetting the timer associated with the resource only when the alarm has been
generated for the resource.

46. (Currently Amended) A method of monitoring resource utilization within a
connection oriented network made of network elements, at least one of said network
element including a connection resource tracker for maintaining a database of
resource utilization, the method comprising the steps of:

5 specifying a plurality of resource types for the network elements of the
6 connection oriented network, each resource type being defined by a capacity limit
7 and a utilization;

8 providing a utilization threshold and a specified threshold for each specified
9 type of resource, wherein the utilization threshold is set at a threshold value used to
10 determine whether resources are being under-utilized and the specified threshold is
11 set at a threshold value used to determine whether resources used are below a
12 minimum allowable limit;

13 monitoring for receipt of call connection establishment signals;

14 measuring the utilization threshold for all resources at a network element;

15 in response to a query from a user relating to a particular type of resource in
16 said database, comparing the utilization for all resources of the particular type as
17 measured in the measuring step with the utilization threshold for said particular
18 type for determining whether the utilization of any resource of said particular type
19 is below the corresponding utilization threshold;

20 if the utilization is below the corresponding utilization threshold for at least
21 one said resource, generating a report and identifying in the report each resource of
22 the particular type for which the utilization is below the corresponding utilization
23 threshold and presenting the report to an operator of said connection oriented
24 network; and

25 if the utilization is below the corresponding specified threshold for at least
26 one said resource, checking whether a flag associated with the resource indicates

27 that an alarm has recently been generated for the resource, and, if the flag does not
28 indicate that the alarm has recently been set, generating the alarm and setting the
29 flag to indicate that the alarm has recently been generated.